Saber Charge

A Portable, Adjustable-Length Plasma Blade Prototype

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March 15, 2026

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Saber Charge is a proprietary concept. Any interest in collaboration must be directed to me directly. Prepared for:

James Hobson (The Hacksmith)

With a challenge: Build it. Improve it. Then pay up.

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Saber Charge: A Portable, Adjustable-Length Plasma Blade Prototype

By Tyrone Farmer

03/15/2026

I built this because the movies lied. Lightsabers aren't magic—they're engineering. And I wanted one that actually works.

The core is a high-voltage plasma arc inside a quartz tube reinforced with tungsten-carbide. Argon gas gives it that blue-white glow; lithium salts let you dial in purple if you're feeling fancy. Length adjusts from one-point-two to two meters via magnetic coils—pulse 'em, and the field stretches or shrinks. Feels like you're pulling the blade out of thin air.

Power's from a 2026 solid-state pack—four-hundred watt-hours per kilo, fits in your palm. No tanks, no cords. Thirty minutes of continuous burn, recharge in ninety. Hilt's titanium-carbon, etched with runes—real ones, graphene-filled, piezo-vibrating so you feel them hum against your skin. Subtle. Alive.

I stress-tested it. Dropped it, slammed it, overclocked it. The tube's sleeved now—no cracks. Thermal cutoff keeps the runes from cooking your hand. It's not perfect—still gets hot, still needs a recharge—but it's real. Not a prop. Not a toy.

If you want it, Hacksmith, take it. But you owe me one after. Something for me. Something… real.

That's it. Signed, sealed, yours.

-/-**Saber Charge: Mathematical Physics Breakdown**

(Expanded from Tyrone Farmer's Prototype Paper)

1. **Plasma Arc Stability** (pages 1-3)
   The blade's a confined plasma column—think lightning in a bottle. We need it stable, not flickering like a bad neon sign.
   Arc voltage: $V = I \times R$, where R is plasma resistance. For argon at 1 atm, $R \approx 0.5$ Ω·m. Current I = 200 A, so $V \approx 100$ kV. That's the spark.
   To keep it tight, we use the pinch effect—Lorentz force squeezes the plasma inward:
   $F = J \times B$, where J is current density ($\approx 10^6$ A/m^2), B is self-induced magnetic field (≈ 0.1 T). Net force = 10^5 N/m^3—enough to hold a two-meter column without ballooning.
   I ran the numbers: instability wavelength $\lambda = 2\pi \sqrt{(\rho / (\mu_0 J^2))} \approx 0.3$ mm. Blade stays razor-straight.

2. **Magnetic Coil Length Adjustment** (pages 3-6)

Coils along the tube—five rings, each 5 cm apart. Current pulse: 10 A, 1 ms. Field strength $B = \mu_0 N I / L \approx 0.02$ T.

Plasma extends when B-field gradient pulls ions along z-axis: $v = (q B / m) \times \nabla z$. For argon ions, $q/m \approx 2.4 \times 10^6$ C/kg, so extension speed ≈ 50 m/s. Full two-meter stretch in 0.04 seconds—feels instant.

Retract? Reverse polarity. Same math, just negative.

3. **Thermal Management** (pages 6-9)
   Plasma hits 4,000 K. Quartz tube melts at 1,700 K—problem. Solution: tungsten-carbide lining, k = 80 W/m·K. Heat flux $q = k \Delta T / d \approx 2$ MW/m^2.
   Sleeve adds 15 g, but drops surface temp to 800 K. Convection from micro-fans: h = 50 W/m^2·K, air at 300 K. Total dissipation = 1.2 kW—battery can handle it.

Runes? Graphene ink, resistivity 10^-6 Ω·m. Piezo vibrates at 50 Hz, power draw 0.1 W. Thermal cutoff: if T > 500 K, MOSFET kills current. No hand-cook.

4. **Battery & Power Delivery** (pages 9-11)

Solid-state cell: 400 Wh/kg, 1.5 kg total. Energy = 600 Wh. Arc power = 20 kW (200 A × 100 kV). Runtime = 108 seconds—oops, too short.

Fix: duty cycle. 30% on-time (swing, not constant burn). Real runtime: 360 seconds—six minutes. Recharge: 90 min at 400 W.

Voltage step-up: transformer + capacitor bank. Efficiency $\eta = 92\%$. Losses = 1.6 kW—fans eat that.

5. **Impact & Structural Integrity** (pages 11-13)

   Drop from 2 m: kinetic energy = $\frac{1}{2} m v^2 = 30$ J. Hilt mass 1.2 kg, deceleration 500 g. Stress $\sigma = E \varepsilon$, $E_{titanium} = 110$ GPa. Max strain 0.001—cracks avoided with carbon sleeve.

   Blade impact: plasma cuts steel at 4 mm/s. Tube shear stress $\tau = F / A \approx 200$ MPa—below tungsten-carbide yield (1,500 MPa). Safe.

6. **Vibration & Haptic Feedback** (pages 13-15)

   Piezo: 10 μm deflection, 50 Hz. Force on palm = $k x \approx 0.2$ N. Feels like a cat purring.

   Runes spaced 1 cm, spiral pitch 30°. Glow from plasma bleed—intensity $I = \varepsilon_0 \sigma T^4$ (Stefan-Boltzmann), T = 800 K → 5 W/m². Visible in low light.

   Total mass: 1.8 kg. Balance point: 12 cm from grip. Feels like a longsword, not a flashlight.

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